Lesson no. 13 Thyme (saatar).

It is also called as common thyme, german thyme, garden thyme or thyme. Its Latin name is Thymus vulgaris; its botanical family is Lamiaceae. Its wild variety is called as Thymus serphyllum; it is of many types; it is a flowering plant in mint family, native to southern Europe; it is mentioned in book on Tibb e Nabi, Zaadul Maad & in Hadith of Baihaqi. In Hadith it is advised to fumigate our house with it along with Loban & Al-Sheeh. There are lesson on all these is my part-2 book please read them. Please read lesson no. 54 Thyme, also read lesson no. 44 Cress & 64 Benzoin (Loban).

- ***NAMES:-***

1. In Hadees it is called as Sau'atar (صعتر).
2. Common name is Saatar Farsi.
3. In Latin it is called as Thymus serphyllum
4. In English it is called as Creeping Thyme. (It is called by many names).
5. But many Indian scholars say it is Zataria multiflora (Latin name).
6. In Arabic it is called as Za'atar.
7. It is among the Thymes genus plants.

Please visit my website www.tib-e.nabi-for-you.com for detail Islamic study on Thyme.

It is mentioned in following books of Hadith (reference are also given as Hadith number) Ibn Majah : 3573, 3574, 3575; Tirmizi 2176, 2212.

- ***Plant: -***

Thymus vulgaris common thyme

Wild thyme

It is a mint flowering plant; grows 15 to 30 cm tall & 40 cm wide; it is a busy, woody-based evergreen sub-shrub with small, highly aromatic, grey-green leaves & cluster of purple or pink flowers in early summer. It is useful in garden as ground-cover plant, where it can be short-lived, but is easily

propagated from cuttings; it is also the main source of thyme as an ingredient in cooking & as an herbal medicine. It is perennial herb & low shrub; there are about 350 species of it.
Thyme & wild thyme are very famous variety of it; leaves of thyme are popularly used to prepare essential oil; wild thyme is also called as creeping thyme or mother of thyme. Both are used as medicinal herb & are important nectar source for honey bee. The word thyme is also used for its dried leaves of thyme variety used for seasoning; whole plant is edible & used for cooking & as an herb.

- ***Leaves: -***


Leaves are opposite, each pair at right angle to the previous one (decussate) or whorled. Leaves are oval shaped, entire, small, 4 to 20 mm long, leaves tend to be rolled inwards & slightly hairy. Leaves are mainly used as herb, cooking, preparing oil; it contains thymol as an active ingredient & due to it have a strong flavour.

- ***Flowers: -***


Its flowers are bilaterally symmetrical & have 5 united petals & 5 united sepals. Flowers are tiny, dense terminal headed, it has uneven calyx, with the upper lip 3 lobed & lower cleft; the corolla is tubular, 4 to 10mm long; flowers are of white, pink, blue or purple depending on the species. Flowers are also used in cooking & used as an herb.

- ***Seeds: -***



Seeds are tiny & abundant.

- ***Stems:-***

Its stem is narrow or even wiry.

- ***Oil: -***

It is essential oil; it contains 20 to 55% thymol in it; thymol is an antiseptic. Its oil is antiseptic, used as medicated bandages, best for toe-nails, it is also anti spasmodic, diuretic, calming, anti bacterial, increases immunity, relieves toothache, reduces pain & swelling.

- ***Tea: -***

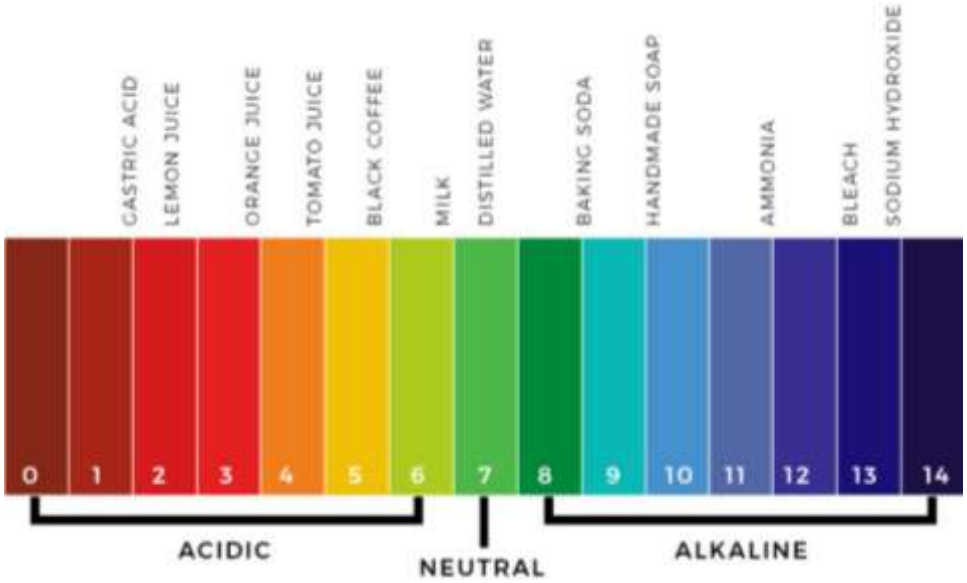
Its leaves, flowers etc are used to prepare a medicinal tea which is best for bronchitis, respirative infection, anti-inflammatory, relieves sore throat, heals wounds, its tea is given to mother (in Jamaican) after delivery of the baby for oxytocin like effects to cause uterine contraction & more rapid delivery of placenta.

- ***pH of Thyme is: -*** pH 5.5 to 7; it is mild acidic to alkaline; because its pH is around 7.

pH is a measure of hydrogen ion concentration, a measure of the acidity or alkalinity of a solution. The pH scale usually ranges from 0 to 14. Aqueous solutions at 25°C with a pH less than 7 are acidic, while those with a pH greater than 7 are basic or alkaline & 7 is neutral; only aqueous solutions have pH levels, vegetable oil has no pH value. Likewise, other oils such as animal and petrochemical oils also have no pH value. Fatty acids are organic molecules often found in foods, including vegetable oils.

The pH of pure water is 7. In general, water with a pH lower than 7 is considered acidic, and with a pH greater than 7 is considered alkaline. The normal range for pH in surface water systems is 6.5 to 8.5, and the pH range for groundwater systems is between 6 and 8.5. We can add normal water to reduce the acidity.

It is Sunnat of Prophet Muhammed (s.a.w) to mixe acidic with Alkaline to make it neutral or less acidic that why He use eat dates with watermelon or cucumber or dry dates with little butter; so you can mix one acidic with alkaline; also it is Sunnat to drink honey mixed in water; also dates or raisins soaked in water over night & drink the syrup (sharbat). Remember do not soak dates & raisin together at one time; soak at separate time & drink.



- ***Calories: -***

100 grams of it serving gives 101 calories.

Glycemic index & Glycemic load of thyme: -

Glycemic index of thyme is 45 which is low GI & glycemic load is also very low but to know exactly.

A food is considered to have a low Glycemic index (GI) if it is 55 or less; mid-range GI if 56 to 69 & high GI if 70 or more. Glycemic index is a number. It gives you an idea about how fast your body converts the carbs in a food into glucose.

A low Glycemic load (GL) is between 1 and 10; a moderate GL is 11 to 19; and a high GL is 20 or higher. For those with diabetes, you want your diet to have GL values as low as possible.

The glycemic load (GL) of food is a number that estimates how much the food will raise a person's blood glucose level after eating it. Glycemic load accounts for how much carbohydrate is in the food and how much each gram of carbohydrate in the food raises blood glucose levels.

- ***Gross health benefits & indications of thyme oil:-***

It reduces nervous weakness, respirative problems; increases circulation, digestion; reduces digestive problems & urinary problems; cures arthritis, cold & cough, gouts, eczema, congestion, muscular pain, obesity, rheumatoid arthritis, tonsillitis, gums infection, heals wounds etc.

- ***Gross health benefits & indications of thyme tea: -***

It's a good carminative, reduces colicky pain, dyspepsia, it control fever, cold & cough etc.

- ***Gross health benefits & indications of thyme leave powder: -***

It relieves arthritis, sore throat, fever, infections, urinary problems, respirative problems, digestive problems, gouts, stomach ache, reduces diarrhea, heals wounds, maintains heart health, moods etc.

- ***Clinical pharmacology of thyme: -***

The main component of the essential oil of Thyme, thymol, is active against Salmonella and Staphylococcus bacteria. The antiseptic and tonic properties of Thyme make it a useful tonic for the immune system in chronic, especially fungal, infections as well as an effective remedy for chest

infections such as bronchitis, whooping cough, and pleurisy. Thyme and Thyme oil have been used as fumigants, antiseptics, disinfectants, and mouth washes. The pleasant-tasting infusion can be taken for minor throat and chest infections, and the fresh leaves may be chewed to relieve sore throats. Thyme is prescribed with other herbs for asthma, hayfever, and is often used to treat worms in children. Thyme has been thought to be antiseptic, antimicrobial, astringent, anti-helmintic, carminative, disinfectant, medicinal drug and tonic. Thyme is incredibly useful in cases of assorted intestinal infections and infestations, like hookworms, ascarids, gram-positive and gram negative bacteria, fungi and yeasts such as Candida albicans. Its active constituent, thymol, is active against enterobacteria and coccid bacteria. Thyme may also improve liver function and act as an appetite stimulant. It will be used in treatment of cartilaginous tube, bronchial and urinary infections Thyme is helpful in treatment of laryngitis and inflammation. The main component of the volatile oil of Thyme, thymol, is active against enterobacteria. It is used for skin issues like oily skin, sciatica, acne, dermatitis and bug bites. A corrected product, white Thyme oil' is also used and it's milder on the skin. Applied to the skin, thyme relieves bites and stings and relieves neuralgia and rheumatic aches and pains. There more benefits given below in separate content explanation.

- ***Modern uses: -***

For general health: -

Take some dried or fresh leaves, flower (whole plant) of thyme & soak in little water for some time & boil to prepare tea like & drink do not add milk in it, drink it empty stomach early morning twice a week regularly,

For weakness, typhoid, and malaria: -

Take some whole plant of thyme (leaves, flower etc) dried or fresh soak in little water for sometime also add following 7 seeds of black caraway, 7 seeds of fenugreek seeds, 1 dates, some barley & boil all together to prepare tea like add 1 spoon pure honey & drink three times a day till complete recovery.

For pesticide: -

Fumigate your houses with thyme dried leaves & loban (Styrax benzoin) to keep the house pest free once or twice a week.

- ***Content/constituents of fresh common thyme: -***

All contents may not present in all types of it, because there are many varieties of it according to geographical regions & content may differ a lot as per cultivation, soil, seed, climate etc.

Water 65%, protein, carbohydrate, dietary fiber, omega 3, omega 6, vitamin A, C, K,E, B1, B2, B3, B5, B6, B9, calcium, iron, magnesium, phosphorus, potassium, sodium, zinc, copper, manganese, flavonoid like (lutein & zeaxanthin, cryptoxanthin, apigenin, naringenin, luteolin, thymonin), selenium, beta carotene, carotenoid, choline, lycopene, boron, mono-unsaturated fats (like myristoleic, pentadecanoic, heptadecanoic acid , linolenic acid), palmitic acid, rosmarinic acid, ash, caftaric acid, chlorogenic acid, syringic acid, caffeic acid, Muurolene.

- ***Contents/constituents of thyme oil: -***

Thymol, p-cymene, myrcene, borneol, linalool, carvacrol, thujone, pinene, cineole, geranoil, caryophyllene, camphene.

Active component of thyme: - Thymol, rosmarinic acid, phenol, flavonoids, terpenes.

Total ORAC (oxygen radical absorbance capacity, it is an antioxidant capacity measuring method) value is 27426 umol TE/100 grams.

Total amino acids in fresh thyme (100 grams contents): -

Fresh thyme	Fresh
Weight (g)	100 grams have
Tryptophan(mg) (% RDI)	114 (41%)
Threonine(mg) (% RDI)	154 (15%)
Isoleucine(mg) (% RDI)	285 (20%)
Leucine(mg) (% RDI)	262 (10%)
Lysine(mg) (% RDI)	126 (6%)
Valine(mg) (% RDI)	307 (17%)

The above ingredients are based on scientific study, means these has been indentified, known & learnt by modern science, it does not means that it contains only these ingredients, there may be many more ingredients which are yet to be discovered, learnt & known by modern science.

Basic pharmacology of contents of thyme & its oil that are naturally present & not synthetic: -

- ***Thymol: -***

It is a natural mono-terpenoid phenol mostly present in thyme plant; it has pleasant aromatic odour, it is anti hook worm.

Main sources of thymol: -

Thyme oil, eye bright plant (Euphrasia rostkoviana), monarda didyma & origanum compactum.

Basic pharmacokinetics of thymol (based on human intake in natural food products): -

It is readily absorbed in intestines on oral administration; it is essentially excreted in urine within the first 24 hours after absorption.

Basic clinical pharmacology of thymol: -

It reliefs headache, diarrhea; it is anti cancer, anti septic, anti inflammatory, antioxidant, anti fungal, anti spasmodic, anti bacterial, prevent free radical, cardio vascular disease, it is analgesic, reduces lipids, treat pain & neurological diseases.

- ***Rosmarinic acid: -***

It is an ester of caffeic acid & 3, 4 dihydroxyphenyllactic acid; it is commonly found in Boraginaceae family plants; it is of red-orange colour; it is water soluble; it is polyphenolic in nature.

Main sources of rosmarinic acid: -

It is present in fresh & dried thyme, sage, dried marjoram, dried peppermint, dried & fresh rosemary, and dried sweet basil.

Basic pharmacokinetics of rosmarinic acid (based on human intake in natural food products): -

Its absorption, metabolism & excretion are yet not known & are under research. It is well absorbed in gastrointestinal tract & through skin.

Basic clinical pharmacology of rosmarinic acid: -

It is anti-inflammatory, analgesic, anti pyretic, platelet inhibitor; it blocks the synthesis of prostaglandin.

- ***Terpenes: -***

It is a group of volatile unsaturated hydrocarbons organic compound found in essential oils of plants; they have a strong odour & it protects the plant.

Main sources of terpenes: -

It is commonly present in mangoes, hops, lemon grass, thyme etc.

Basic pharmacokinetics of terpenes (based on human intake in natural food products): -

Its absorption, metabolism & excretion are yet not known & are under research. It is well absorbed in gastrointestinal tract & through skin.

Basic clinical pharmacology of terpenes: -

It is anti-inflammatory, analgesic, reduces migraine pain, headache, stimulates many brain chemicals which benefits in reducing pain, inflammation etc.

- ***Camphene: -***

It is a bicyclic mono-terpene, soluble in water; volatile in nature in room temperature; has a pungent smell. Please do not get confused with camphin & camphene, both are different; it has a role as a plant metabolite & a fragrance; it has structure as exactly 2 rings which fused to each other so called as bicyclic. It is present in dill, caraway, hyssop, fennel, camphor oil, citronella oil, thyme oil, ginger oil, cypress oil, thyme oil etc; it is used in medicine, fragrance, flavouring in food. It is absorbed through skin, inhalation & ingestion; it is anti fungal, anti microbial, antioxidant, analgesic, reduces lipids, anti viral, expectorant, anti septic, anti biotic, heals wounds, reduces swelling, headache, migraine etc. Its absorption, metabolism in under research & not known yet.

- ***Cineole: -***

It is mono-terpene ether present in essential oils & used in fragrance, flavoring, medicines, cough drops, personal care products, used as expectorant, anti septic. It is main constituent of eucalyptus oil; it is colourless, oil, slightly soluble in water. It has camphor like odour & pungent spicy cooling taste; it is also called as eucalyptol; it is anti inflammatory, anti viral, antioxidant, anti spasmodic, increase cerebral blood flow, anti fugal, immune-regulator, helpful in sinusitis, asthma, acute & chronic bronchitis, sore throat, laryngitis, herpes simplex, acne, measles, chicken pox, ulcers, wounds, boils cuts, burns; it is mucolytic, analgesic, clears the airway. It is present in sweet basil oil, common sage, bay leaves, camphor laurel, tea tree, worm-hood, mugwort, rosemary, thyme oil, cannabis sativa. Its absorption & metabolism is not known.

- ***Geraniol: -***

It is a mono-terpene found in many essential oils of fruits & vegetables, herbs like rose oil, citronella, lemon grass, lavender, thyme oil etc. it is emitted from flowers of many spices of plants & used in food, fragrance & cosmetic products; it is microbial, anti inflammatory, antioxidant, anti cancer, neuro-protective, anti cancer, anti tumour. It is colourless or little yellowish, slightly water soluble & has a sweet odour rose oil like; its absorption, metabolism is not known.

- ***Borneol: -***

It is a bicyclic organic compound and a terpene derivative; it is naturally found in two forms enantiomers (opposite or mirror image) as d & I. It aids the digestive sytem by stimulating the production of gastric juices, tone of heart, improves circulation; treats bronchitis, cough & cold; can relieve pain cause by rheumatic diseases & sprains; reduces swelling, relives stress. It is under research.

- ***Caryophyllene: -***

It is a natural bicyclic sesquiterpene present in many essential oils like clove oil (syzygium aromaticum stem & flower oil), cannabis sativa oil, rosemary oil, hops oil, basil oil, lavender oil, cinnamon oil, black caraway, thyme oil. It is anti inflammatory, analgesic, prevents arthrosclerosis, osteoporosis, colitis, osteoarthritis, diabetes, cerebral ischemia, anxiety, depression, liver fibrosis, anti cancer. Its absorption & metabolism is not known.

- ***Thujone: -***

It is a ketone & mono-terpene that occurs naturally in two forms alpha & beta; it has a menthol odour; it acts on GABA as an antagonist (opposite to the effects of alcohol); it is used in perfumes; it is present in thyme oil, arborvitae, nootka cypress, oregano, common sage, tansy, worm-wood. In high & toxic dose it is convulsant & neuro-toxic. Its absorption, metabolism is not known & is under research.

- ***Luteolin: -***

It is a tetra-hydroxy flavone (flavonoids are polyphenolic compounds); a naturally occurring flavonoid

Main sources of luteolin: -

Celery seeds, thyme, green pepper, fenugreek seeds, broccoli, carrot, orange, basil etc.

Basic pharmacokinetics of luteolin (based on human intake in natural food products): -

Its absorption, metabolism & excretion are yet not known & are under research.

Basic clinical pharmacology of luteolin: -

It is famous for activities like anti oxidant, anti inflammatory, apoptosis (inducing & chemo-preventive activities), reduces free radicals, oxidative stress, reduces tumour cell growth & suppresses metastasis & cancer growth.

- ***Apigenin: -***

It is a natural flavonoid compound found in many fruits & vegetables serves multiple physiological functions.

Main sources of apigenin: -

It is present in onion, oranges, wheat, tea, grapes, parsley, thyme.

Basic pharmacokinetics of apigenin (based on human intake in natural food products): -

Its absorption, metabolism & excretion are yet not known & are under research.

Basic clinical pharmacology of apigenin: -

It calms the nerves, provides antioxidant effects, prevents & helps the body to fight cancer; it is anti-obesity; neuro-protective, help mood & brain function; reduces cortisol, blood sugar; improves bone, heart & skin health; promotes sleep. It is also anti bacterial, anti viral; reduces blood pressure.

- ***Naringenin: -***

It is bitter colourless flavanone a type of flavonoid, it mainly present in grapes.

Main sources of naringenin: -

It is present in grapes, tomato, cocoa, sour oranges, Greek oregano, beans, thyme etc.

Basic pharmacokinetics of naringenin (based on human intake in natural food products): -

It is readily absorbed through intestinal epithelium by passive diffusion, it gets in to the blood stream by multi-drug resistance-associated protein (Mrp1) or can be transported by active efflux protein carrier P-glycoprotein (P-gp) & Mrp-2 back to the intestine lumen, out of the enterocytes, repeating the cycle. Liver metabolize it via phase 2 conjugation by UDP-glucuronosyl transferase (UGT) & etc.

Basic clinical pharmacology of naringenin: -

It is anti inflammatory, antioxidant, it helps in controlling blood pressure, blood sugar, obesity, metabolic syndromes; it is anti cancer, helpful in curing liver diseases.

- ***Thymonin: -***

It is a trimethoxyflavone that is flavone substituted by methoxy group; it is also called as majoranin, mucroflavone-B; it is also present in sweet marjoram, thyme plant; it calms muscles spasm, improves muscles

tone, increases exchange of chemical between cells, repairs tissues, maintain flexibility, reduces inflammation, helps in growth of new blood cells.

- ***Carvacrol: -***

It is a mono-terpenoid phenol; it has a pungent, warm odour of oregano, it is also called as cymophenol. It is present in thyme oil, oregano, pepperwort, wild bergamot. It helps in curing candida infection & yeast infections; it is anti cancer, anti bacterial, antioxidant, anti-inflammatory, reduces blood pressure, improves gut health; heals wounds etc. it is an active principle of oregano oil. Its absorption, metabolism in human is yet not known.

- ***Myrcene: -***

It is monoterpene & is olefinic natural organic hydrocarbon; its aroma is earthy, fruity & clove like; it is pungent, it synergizes activity of terpenes & it has a role as a plant metabolite etc.
It is present in wild thyme leaves, cannabis, hops, lemon grass, mango, myrica, verbena, cardamom, West Indian bay tree, marjoram, houttuynia, basil etc.
It is useful in treating diabetes, diarrhea, dysentery, blood pressure, reduces pain, increases transdermal absorption, improves glucose tolerance, good for osteoarthritis, also used as flavouring agent, perfume making etc; it crosses blood brain barrier & increases the transport of cannabinoids in the brain,), it is a significant analgesic. It is under research & its absorption, metabolism is not known. It is anti anxiety, anti depressant, sedative, anti inflammatory, anti epileptic, increase immunity.

- ***Linalool: -***

It refers to 2 enantiomers (opposite or mirror image) of naturally occurring mono-terpene found in flowers & plants of many spices; it has a role plant metabolite, a volatile oil component, an anti microbial agent, a fragrance agent, it is present in sweet basil, lavender, laurel, citrus fruits, cinnamon, rosewood, birch tree, tea tree oil etc. It is anti anxiety, anti depressant, sedative, anti inflammatory, anti epileptic, increase immunity. It is under research & its absorption, metabolism is not known.

- ***P-cymene: -***

It is a naturally occurring aromatic organic compound; it is insoluble in water, it has a mild pleasant odour; it floats on water; it is a hydrocarbon mono-terpene; it is present in many essential oils (mainly in cumin & thyme oil).

Main sources of p-cymene: -

Cumin oil, thyme oil, basil oil, carrot seed oil, clove bud oil, angelica root & seed oil, grape fruit oil, eucalyptus oil.

Basic pharmacokinetics of p-cymene (based on human intake in natural food products): -

It is well absorbed through skin; little excreted unchanged & remainder being oxidized to water-soluble metabolism.

Basic clinical pharmacology of p-cymene: -

It is anti inflammatory, reduces pulmonary oedema, it is used for flavouring cakes, beverages, confectionaries, fragrances etc; it is anti bacterial, anti fungal, analgesic, antioxidant, anxiolytic, anticancer, antinociceptive.

- ***Palmitic acid: -***

It is a common saturated fatty acid; it is the first fatty acid produced during lipogenesis (fatty acid synthesis) & from which longer fatty acids can be produced.

Main sources of palmitic acid: -

It is present in olive oil, flaxseed oil, soyabean oil, sunflower oil, palm oil, cocoa butter, meat, milk, pumpkin seed oil, grape seed oil etc.

Basic pharmacokinetics of palmitic acid (based on human intake in natural food products): -

Its absorption, metabolism & excretion are under research.

Basic clinical pharmacology of palmitic acid: -

It softens the skin & keeps it moist thus good for psoriasis & eczema. It coats the skin, it is powerful anti-oxidant; it maintains the health of hair & skin from aging, cleans them from dirt, sweat, excessive sebum (main cause of acne and boil on face & other parts of the body).

- ***Caftaric acid: -***

It is a non-flavonoid phenolic compound; it is an ester formed from caffeic acid & tartaric acid. It has hyaluronidase inhibitory activity; it is present grapes, thyme, vinegar, cone flower, marjoram, purple cone flower; it is antioxidant, enhances insulin secretion.

- ***Syringic acid: -***

It is a naturally occurring Trihydroxybenzoic acid or dimethoxybenzoic acid; it has a role as a plant metabolite, it is a member of benzoic acid & phenols; it can be derive from gallic acid; it is anti-diabetic, it is present in wheat, maize, oats, rice, dates, apple, grapes, olive oil, rape, seed oil ,thyme, marjoram, vinegar, walnut etc.

- ***Caffeic acid: -***

It is 3-4 dihydroxycinnamic acid; it is a type of polyphenol; It is an organic compound that is classified as hydroxycinnamic acid; it is present in all plants; it is a strong antioxidant, anticancer, beneficial in dementia & anti inflammatory, antiviral, boosts athlete performance, reduces blood glucose in diabetes, and reduces aging. It is present coffee, turmeric, thyme, cabbage, apple, mushroom, olive oil etc. Every less is known about it yet.

- ***Muurolene: -***

It is a sesquiterpene & a carbo-bicyclic compound; it is mainly of two types alpha & gamma, both are similarly; both are neuro-protective, anti nociceptive; it is also present in ptychopetalum olaciodes.

- ***Lithospermic acid: -***

It is also known as 2-arylbenzofuran flavonoids; it is pheny-propanoid; it is practically insoluble in water & is moderate acidic compound; It is present in thyme, peppermint, marjoram; it is potential biomarker for consumption of the common thyme & peppermint intake; it is antioxidant, good in diabetic retinopathy.

- ***Chlorogenic acid: -***

It is the ester of caffeic acid & quinic acid; it is among polyphenol & present mainly in coffee; it has similar action & effect to caffeine, but less potent; it reduces the absorption of carbohydrate, reduces blood glucose, blood pressure & is anti-obesity, improves mood.

It is mainly present in apples, pear, carrot, tomato, sweet potato, coffee, thyme, tea, marjoram etc.

- ***Omega 3: -***

It is also called as n-3 fatty acid, it is polyunsaturated fatty acid, it plays important role in human diet & physiology. It is of 3 type alpha linolenic acid, eicosapentaenoic acid (EPA) & docosahexaenoic acid (DHA).

Main sources of omega 3: -

Walnut, flex seed oil, clary seeds, algal oil, almond, hemp oil, fish, egg, fish oil, grape seed oil etc.

Basic pharmacokinetics of omega 3 (based on human intake in natural food products): -

Same as omega 6.

Basic clinical pharmacology of omega 3: -

It reduces risk of cardio vascular disease, cancer, heart disease, inflammation, symptoms of rheumatoid arthritis, promotes brain, nail, hair, skin, bone, joints health, reliefs depression, improves vision, strengthens the body.

- ***Omega 6: -***

It is a polyunsaturated fatty acid, it is also called as w-6 fatty acid or n-6 fatty acid; it is an essential fatty acid (our body needs it but cannot prepare it). The imbalance between omega 3 & 6 may lead to many health problems & heart problems.

Main sources of omega 6: -

It is present in egg, nuts, fish oil, whole grains, vegetables oil, flaxseed oil, grape seed oil, evening primrose oil etc.

Basic pharmacokinetic of omega 6 acid (based on human intake in natural food products): -

It is first hydrolyzed from eaten diet (mostly in triglycerides & phospholipids) by pancreatic enzymes, and then bile is secreted from gall bladder into intestines for further digestion (mostly in ileum). Linoleic acid is the parent compound of omega 6 fatty acid, during digestion & metabolism linoleic acid is converted into Gama linoleic acid & then into dihomo-gama-linolenic acid then into arachidonic acid then into adrenic acid. Its excretion is not yet known & is under research.

Basic clinical pharmacology of omega 6: -

It is beneficial in asthma, arthritis, vascular disease, thrombosis, atherosclerosis, cancer, stroke; increase health of skin, nails, hair, bones, eyes etc, also heals the wounds. But if taken too much in diet can cause high blood pressure, heart disease, blood clots etc.

- ***Linolenic acid (ALA): -***

It is an omega 3 fatty acid, it essential fatty acid necessary for health & cannot be produced in human body, it is also called as ALA (alpha linolenic acid). It is the substrate for the synthesis of longer-chain, more unsaturated fatty acids eicosapentaenoic acid (EPA) & docosahexaenoic acid (DHA) required for tissue function.

Main sources of linolenic acid (ALA): -

Flax seed oil, rape seed oil, soybean, pea leaves, fish oil, evening primrose oil, vegetable oil, walnut, meat, grape seed oil.

Basic pharmacokinetic of ALA (based on human intake in natural food products): -

Same as omega 6

Basic clinical pharmacology of ALA: -

It is useful to prevent heart disease, control blood pressure, control cholesterol, prevents & reverse atherosclerosis, it is anti inflammatory, anti obesity, anti cancer, reduces fibroadenoma, breast lumps, good & helpful for skin, nail, hair, brain, organs.

- ***Myristoleic acid: -***

It is an omega-5 fatty acid; it is biosynthesized from myristic acid; it is not commonly present in plants; it is present in seed oil Myristicaceae family plants, saw palmetto, ginger, garfish, wheat; it is very helpful in prostate cancer; its absorption, metabolism is not know & it is under research.

- ***Pentadecenoic acid & hepatadecanoic acid: -***

Both are odd chained saturated fatty acids; rare in nature, present little in cow milk fat, butter fat of cow milk, little in mutton fat; both are biomarkers of dairy fat intake; there are lot of health benefits of both but are under research & absorption, metabolism is also under research.

- ***Choline: -***

It is water soluble vitamin & essential nutrient, it is a constituent of lecithin; it helps in many functions of the body.

Main sources of choline: -

It is present in watermelon, egg, peanut, fish, dairy products, wheat, beetroot, spinach, beans, whole grains, grapes etc.

Basic pharmacokinetics of choline (based on human intake in natural food products): -

Choline is mostly present in food in free form; it is absorbed in small intestine via transporter proteins & metabolized in liver; excessive choline is not stored but converted into phospholipids; it is changed into Trimethylamine in liver & is excreted in urine.

Basic clinical pharmacology of choline: -

It helps the nerves to develop signals. Our body makes some amount of choline, but should be consumed to avoid deficiency; it helps liver function, brain development, muscles movement, cell messenger system, DNA synthesis, nervous system, gall bladder function; it can be taken in pregnancy because it prevents neural tube defect. It aids in fats & cholesterol metabolism & prevent excessive fat building in liver.

- ***Lycopene: -***

It is a phytochemical of bright red colour carotene & carotenoid; it gives the red colour to the watermelon & other vegetables & fruits like tomato, pink guava, pink grapes, papaya etc. but it is not found in cherry & strawberries, although lycopene is chemically carotene but it has no vitamin A.

Main sources of lycopene: -

It is present in watermelon, olive, pink grapes, papaya, pink guava, grapes etc.

Basic pharmacokinetics of lycopene (based on human intake in natural food products): -

Absorption of it requires bile salts & fats to form a colloidal liquid & mostly absorbed in intestines. It is stored in the body in liver, testes, adrenal glands, ovaries, lungs, prostate gland & plasma; its excretion is not unknown. But if taken in higher doses it was found to be excreted in urine & stools both depending on the dose but when intake in natural fruits or vegetables the amount of it present is very little, that do not matter how it is excreted.

Basic clinical pharmacology of lycopene: -

It is a powerful antioxidant & anti inflammatory thus prevents many types of cancers; it also reduces risk of cardio vascular disease because it helps in keeping the blood pressure normal; it prevents skin from various changes & degeneration, due its antioxidant action cleaning the skin from harmful effects of UV rays; it removes free radicals from the body which float in the body disrupting cells & causing deadly diseases like cancer, asthma, auto-immune diseases etc; it is also helpful in hair health & its problems; it inhibit 5 alpha reductase (means dihydrotestosterone blocker) & reduces PSA (prostate specific antigen) thus helpful in prostate enlargement & prostate cancer; also makes bones strong.

- ***Lutein & zeaxanthin: -***

Both are important carotenoid found in nature, they are related with beta carotene & vitamin A, they gives plants, fruits & vegetables yellow or red colour, they are absorbed best in human when taken with high-fat meal because it needs bile for digestion. Both are colour pigment found in human eye (macula & retina) they get deposited in macula & retina thus prevents many diseases of eyes.

Main sources of both: -

They are present in carrot, broccoli, kale, spinach, grapes, pumpkin, yellow vegetable, egg yolk, green leafy vegetable, orange, kiwi, corn etc.

Basic pharmacokinetics of both (based on human intake in natural food products): -

They are absorbed with the help of bile by mucosa of small intestine via passive diffusion & send to the liver via lymphatic system & in liver it is incorporated into low density & high density lipo proteins & transported to target tissues (retina etc) by specific lutein binding protein mediates the selective uptake of it. The absorption depends on the amount & sources of intake; it is 70 % absorbed; it is excreted in bile & urine & stored in liver & adipose tissues of the body.

Basic clinical pharmacology of both: -

They are powerful anti oxidant, anti diabetic, anti cancer. They prevent age-related macular degeneration, cataract, retinitis pigmentosa, retinopathy, macular degeneration, they work as light filter & protect the eye tissues from sunlight damages, they block blue light from reaching the underlying structure in the retina of eyes thus reduces the risk of light induce oxidative damage that could lead to age-related macular degeneration (AMD).

They also prevent free radicals thus prevents colon cancer, cervical cancer, lungs cancer, breast cancer, prostate cancer, vision loss, improves mental function, respirative infections, reduce high blood pressure, reduce soreness of muscles after exercise, reduce eye strain, controls diabetes, prevent heart diseases etc.

- ***Cryptoxanthin: -***

It is a carotenoid; it is converted into vitamin A in human body & it is considered as provitamin A.

Main sources of cryptoxanthin: -

Red pepper, pumpkin, papaya, carrots, oranges, sweet corn, peaches etc.

Basic pharmacokinetics of cryptoxanthin (based on human intake in natural food products): -

To be absorbed it must be free from its food matrix, emulsified into oil droplets, then taken up by the cells of intestine by 2 mechanism one by facilitative transport assisted by enzymes next by epithelia transport also involved in cholesterol & lipid uptake, however in high pharmacological doses it is absorbed by passive diffusion; after absorption it is converted into vitamin A.

Basic clinical pharmacology of cryptoxanthin: -

It is antioxidant, prevents free radicals damage of DNA & other cells & stimulate repair of oxidative damages to DNA, anticancer, prevents osteoporosis.

- ***Beta carotene: -***

It is an anti oxidant that converts into vitamin A & plays a very important role in human health; it is responsible for the red, yellow, orange colouration in some fruits & vegetables. It promotes eye health & prevents eye diseases.

Main sources of beta carotene: -

It is present in pumpkin, carrot, sweet potato, dark leafy vegetables, apricot, red & yellow pepper, spinach, kale, grapes etc.

Basic pharmacokinetics of beta carotene (based on human intake in natural food products):

It is absorbed in intestine by passive diffusion & get convert into provitamin A in the presence of bile acids, the intestinal mucosa plays a key role in converting it into provitamin A. it is transported in blood plasma exclusively by lipoproteins. The complete absorption, metabolism & excretion in not known fully. It is stored in fats & liver.

Basic clinical pharmacology of beta carotene: -

It is anti oxidant, reduces risk of lung cancer & promote lung health, reduces free radicals thus prevents cancer & heart disease, diabetes, promotes skin health, improves complexion, hair health, eye health, brain health; reduces pimple, acne & other skin problems.

- ***Carbohydrate: -***

It is a macronutrient needed by the body, the body receives 4 calories per 1 gram of it; carbohydrates includes sugar, glycogen, starch, dextrin, fibre & cellulose that contain only oxygen, carbon & hydrogen. It is classified in simple & complex; simple carbs are sugar & complex carbs are fibre & starch which take longer to digest. It is basic source of energy for our body.

Main sources of carbohydrates: -

It is present in watermelon (little), potato, sweet potato, bread, oats, butter, white rice, whole grain rice, pasta, lentils, banana, pineapple, quince, cucumber etc.

Basic pharmacokinetic of carbohydrate (based on human intake in natural food products): -

Its digestion begins in mouth; salivary glands releases saliva & salivary amylase (enzyme) which begins the process of breaking down the polysaccharides (carbohydrates) while chewing the food; now the chewed food bolus is passed in stomach through food pipe (esophagus); gastric juice like HCL, rennin etc & eaten material are churned to form chyme in the stomach; the chyme now is passed little by little down into duodenum, pancreatic amylase are released which break the polysaccharides down into disaccharide (chain of only sugars linked together); now the chyme passes to small intestine, in it enzymes called lactase, sucrase, maltase etc breakdown disaccharides into monosaccharide (single sugar) & absorbed in upper & lower intestines, through villi present in small intestine & send into liver through venous blood present into portal veins, as per bodies need it is releases in the blood stream & pancreas release insulin to use it as source of energy for the body, & extra is stored is converted into glycogen by liver & stored in liver & little is stored in muscles & tissues. Liver can reconverts glycogen in to sources of energy if body lacks for other source of energy, the undigested carbohydrates reaches the large intestine (colon) where it is partly broken down & digested by intestinal bacterias, the remains is excreted in stools.

Clinical pharmacology of carbohydrates: -

Carbohydrates are main sources of body energy, it helps brain, kidney, heart, muscles, central nervous system to function, it also regulates blood glucose, it acts on uses of protein as energy, breakdown of fatty acids & prevent ketosis. If we eat less carbohydrate it may lead to hypoglycemia, ketosis, frequent urination, fatigue, dizziness, headache, constipation, bad breath, dehydration etc.

Excessive intake of carbohydrates may lead to vascular disease, atherosclerosis (leads to narrowing of arteries, stroke, diabetes, obesity, fatty liver, blood pressure etc.

- ***Vitamin A: -***

It is a fat soluble vitamin; it is group of unsaturated organic compound that includes retinol, retinal, retinoic acid & several provitamin A carotenoid. There are 2 types of vitamin A, 1) Vitamin A: - found in meat, poultry, fish & dairy products; 2) Provitamin A: - found in fruits, vegetables, plants; beta carotene is common type of provitamin A; it is an antioxidant, reduces wrinkles & repairs the skin damages; it is available in the market as tretinoin in tablets & creams to heal acne.

Main sources of vitamin A: -

It is present in watermelon, fish oil, carrot, green leafy vegetables, citrus fruit, sweet potato, spinach, kale, quince, pumpkin, grapes etc.

Basic pharmacokinetic of vitamin A (based on human intake in natural food products): -

It is absorbed in jejunum mainly, little through skin; metabolism is in liver & excreted in urine & stools, it is conjugated with glucuronic acid & then changed into retinal & retinoic acid; retinoic acid is excreted in stool, mainly. It is stored primarily as palmitate in Kupffer's cells of liver, normal adult liver stores sufficient amount of it which is enough for 2 years for the body, little is stored in kidneys, lungs, adrenal glands, fats, retina; it is excreted in urine & stools.

Clinical pharmacology of vitamin A: -

it is needed by the body for vision and maintains eye health speacially retina; it prevents night blindness; it helps in normal reproduction of cells thus prevents cancer; it is required for proper growth & development of embryo throughout the pregnancy period, it is good for skin, supports immune function; helps the heart, kidneys & lungs to work properly.

- ***Vitamin K: -***

It is a fat soluble vitamin; it is essential for normal blood clotting; it occurs naturally in two forms, vitamin K1 (phylloquinone) which is widely distributed in plants; it is present in it; Leafy vegetables are good sources of K1; vitamin K2 (menaquinones) is synthesized in alimentary tract by bacteria (Escherichia coli & other bacteria).

Main sources of vitamin K1: -

It is present in olive oil & also present in green leafy vegetables (spinach, kale etc) cauliflower, cabbage, broccoli, sprout, fish, liver, meat, egg, cereals, pumpkin, grapes etc.

Basic pharmacokinetics of vitamin k (based on human intake in natural food products): -

It is absorbed in small intestine, bile is required for it absorption & stored in fatty tissues & liver; it is excreted 40% to 50% in stools & 30% to 40% in urine.

Basic clinical pharmacology of vitamin K: -

It acts on synthesis of certain proteins that are prerequisites (necessary) of blood coagulation (means act on stop bleeding) & body also needs it to control the binding of calcium in bones & other tissues. Deficiency of it makes bones weaker, calcification of arteries & other tissues thus take care of bones, joints & heart; it reduces tumour growth & is helpful in cancers.

- ***Vitamin E: -***

It is fat soluble vitamin; it is a group of eight fat soluble compounds that includes four tocopherols & four tocotrienols.

Main sources of vitamin E: -

It is present in olive oil, almonds, cereals, wheat germ, sunflower oil, corn oil, soybean oil, peanuts, green leafy vegetables, pumpkin, grapes etc.

Basic pharmacokinetics of vitamin E (based on human intake in natural food products): -

It is absorbed in small intestines & metabolized in liver & distributed through lymphatic system & stored in fat droplets of adipose tissue cells; it is mainly excreted in stool, little in urine & through skin.

Basic clinical pharmacology of vitamin E: -

It prevents coronary heart disease, supports immune system, prevent inflammation, promotes eye health, lowers the risk of cancer; It is a powerful anti-oxidant thus reduces UV damage of skin, nourishes & protects the skin when applied on face; also promotes hair growth.

- ***Carotenoid: -***

It is a fat soluble; it is also called as tetraterpenoid; it is an organic pigment produced in plants giving them bright red, yellow, orange etc colour. It helps the plant to absorb light energy for photosynthesis; it protects our body from diseases & maintains health. It is of more than 600 types of which 50 to 60 types are eaten in food by human. It is not made by our body we depend on food source to be eaten.

Main sources of carotenoid: -

Carotenoid is present in olive oil, watermelon, tomato, kale, oranges, olive, carrot, plums, apricots, mango, sweet potato, kale, spinach, coriander, grapes etc.

Basic pharmacokinetics of carotenoid (based on human intake in natural food products): -

It is fat-soluble; It first gets emulsified followed by solubilized in micellar then require bile salts & absorbed in intestine, little is absorbed in stomach; it is excreted in stools (research in on), it is stored in body fats and will convert the stored carotenoid into vitamin A when needed by the body and use it.

Basic clinical pharmacology of carotenoids: -

It is converted into vitamin A in our body, it is essential for vision, immune system, prevents cardio vascular disease, it helps reducing inflammation, cancers risk.

- ***Vitamin C: -***

It is also called as Ascorbic acid; it is an essential water soluble vitamin, very much needed by the body for many functions & absorption etc.

Main sources of vitamin C: -

It is present in watermelon, citrus fruit, broccoli, cauliflower, sprouts, capsicums, papaya, strawberries, spinach, green & red chillies, cabbage, leafy vegetables, tomato, cereals, quince, cucumber etc.

Basic pharmacokinetic of vitamin C (based on human intake in natural food products): -

It does not need to undergo digestion, 80 to 90% of it eaten is absorbed by intestine cell border by active transport & passive diffusion & through ion channels it enters the plasma via capillaries. It is very little stored in adrenal glands, pituitary gland, brain, eyes, ovaries, testes, liver, spleen, heart, kidneys, lungs, pancreas & muscles. All together body can store 5 grams of it & we need 200mg/day in order to maintain its normal level & uses, but old, disease person, smokers & alcoholic need more daily value. It is excreted in urine in the form of dehydroascorbic acid changed by liver & kidneys both, but unused vitamin C is excreted intact.

Basic clinical pharmacology of vitamin C: -

It prevent cough & cold, repairs tissue, acts as an enzyme for curtain neurotransmitter, important for immune function, it is a powerful antioxidant (donates electron to various enzymatic & non-enzymatic reactions); body prepares collagen with the help of vitamin c; it is also helpful in Alzheimer's, dementia, acts on iron absorption, it protects the body from oxidative damages, reduces stiffness of arteries, reduces tendency of platelets to clump each other, improves nitric oxide activity (dilatation of blood vessels) thus prevents high blood pressure & heart disease, also prevent eye disease, reduces risk of cataract, prevents the lining of lungs & prevents lung disease, it is a natural antihistamine (anti allergy), eliminates toxins from the body. Deficiency of it causes Scurvy disease (brown spots on skin occurs, swelling of gums, bleeding from all mucous membrane, spots are more on thighs & legs, the person looks pale, feel depressed, cannot move, loss of teeth, suppurative wounds occur.

- ***Vitamin B1 (Thiamin): -***

It is called as Thiamin also; it is a water soluble vitamin, it belongs to B-complex family, it is an essential micro nutrient which cannot be made by our body.

Main sources of vitamin B1: -

It is present in watermelon, spinach, legumes, banana, quince, wheat germ, liver, egg, meat, dairy products, nuts, peas, fruits, vegetables, cereals, rice, breads, oats, cucumber etc.

Basic pharmacokinetic of vitamin B1 (based on human intake in natural food products): -

Intestinal phosphatases hydrolyze thiamin to make it free & absorbed in duodenum, jejunum mainly through active transport in nutritional doses & passive diffusion in pharmacological doses, very little is known about its absorption; it is metabolized in liver; it is excreted in urine & stored little in liver, heart, kidney, brain, muscles.

Clinical pharmacology of vitamin B1: -

It is needed for metabolism of glucose, amino acids (proteins), lipids (fats) etc; every cell of the body require it to form ATP (adenosine triphosphate) as a fuel for energy, also it enables the body to use carbohydrates as sources of energy; also nerve cells, heart cells, muscles cell require it to function normally; its deficiency causes beri-beri heart disease, weight loss, confusion, malaise, optic neuropathy, irritability, memory loss, delirium, muscles weakness, loss of appetite, tingling sensation in arms & legs, blurry vision, nausea, vomiting, reduce refluxes, shortness of breath etc; it is helpful to immune system; excessive intake of carbohydrates, protein, glucose (speacially in body builders, athletes etc) increases the need of vitamin B1.

- ***Vitamin B2: -***

It is also called as Riboflavin, it is a water soluble vitamin, it is an essential micro nutrient, it helps many systems of the body; it is not synthesized in human body.

Main sources of vitamin B2: -

It is present in watermelon, liver, milk, dairy products, nuts, egg, fish, leafy vegetables, almonds, mushroom, lean meat and quince, cucumber.

Basic pharmacokinetic of vitamin B2 (based on human intake in natural food products): -

It is phosphorylated in the intestinal mucosa during absorption; mainly absorbed in upper gastrointestinal tract; the body absorbs little from a single dose beyond of 27mg; when excessive amount is eaten it is not absorbed; very little is known about its absorption. The conversion of it into its coenzymes takes place mainly in cells of small intestines, heart, liver, kidneys & throughout the body in many cells; it is excreted in urine & stored little in liver, heart, kidneys & in tissues of the body.

Basic clinical pharmacology of vitamin B2: -

It is needed by the body to keep skin, eyes, nerves, red blood cells healthy, it also helps adrenal gland, nerve cells, heart, brain to function; it also act in metabolism of food, amino acids (protein), fats, helps to convert carbohydrate into energy (Adenosine triphosphate formation- the energy body runs on). It plays an important role in functioning of mitochondria.

Its deficiency is called as Ariboflavinosis & causes weakness, throat swelling, soreness of mouth & tongue, cracks on skin, dermatitis, anemia, weak vision, itching & irritation in eyes, migraine.

- ***Vitamin B3: -***

It is called as Niacin or Nicotinic acid; it is in 2 forms niacin & nicotinamide acid; it is water soluble vitamin; it is an essential micro nutrient; it plays a role in over 200 enzymatic reactions in the body; It is produced in the body in small amount from tryptophan which is found in protein containing food & sufficient amount of magnesium, vitamin B6 & B2 (are needed to produce it).

Main sources of vitamin B3: -

It is present in watermelon, green peas, peanuts, mushroom, avocados, meat, egg, fish, milk, cereal, green vegetables, liver, chicken, coffee, potato, corn, pumpkin, tomato, almonds, spinach, enriched bread, carrots, quince, cucumber etc.

Basic pharmacokinetic of vitamin B3 (based on human intake in natural food products): -

If eaten in natural form it is absorbed in stomach & small intestines by the process of sodium-dependent carrier-mediated diffusion in 5 to 20 minutes; if taken in therapeutic doses get absorbed by passive diffusion in small intestines. Its uptake in brain requires energy, in kidneys & red blood cells requires a carrier. It is metabolized in liver in 2 ways either is conjugated with glycine or niacin is form into nicotinamide; it is stored little in liver unbounded to enzymes. It is excreted in urine.

Basic clinical pharmacology of vitamin B3: -

It regulates lipid level in the body; it acts on carbohydrate to form energy sources for the body, it ease arthritis, boost brain function, every part of body needs it to function properly, it helps convert food into energy by aiding enzymes & cellular metabolism, it acts as an antioxidant. It prevents heart disease. Deficiency of it causes pellagra, high blood cholesterol, memory loss, fatigue, depression, diarrhea, headache, skin problems, lesion in mouth, tiredness etc.

- ***Vitamin B5 (pantothenic acid): -***

It is also called as pantothenic acid, it is water soluble vitamin, it is a micro nutrient, it is necessary for making blood cells; acts to convert eaten proteins, carbohydrate, fats into energy; it is a component of coenzyme A; it is used in synthesis of coenzyme A. (coenzyme A acts on transport of carbon atoms within the cell).

Main sources of vitamin B5: -

It is present in watermelon, quince, meat, chicken, liver, kidney, fish, grains, milk, dairy products, legumes, pumpkin, grapes etc.

Basic pharmacokinetic of vitamin B5 (based on human intake in natural food products): -

It is converted into free form by intestinal enzymes & in nutritional doses it is absorbed in intestinal cells via sodium dependent active transport system in jejunum & pharmacological doses are absorbed by passive diffusion; after absorption the free form of it is now transported to erythrocytes via plasma, in cells pantothenic acid is converted into CoA, all the body tissues can convert it into CoA & ACP (acyl carrier protein), after these two complete their jobs they are degraded to form free pantothenic acid & other metabolites. It is excreted in urine & stools & little in exhaled in carbon dioxide.

Basic clinical pharmacology of vitamin B5: -

It promotes skin, hair & eyes health, proper functioning of nervous system & liver, formation of red blood cells, making of adrenal hormones, sex hormones; it is very helpful in constipation, rheumatoid arthritis, acne, allergies, asthma, baldness, colitis etc.

Its deficiency causes fatigue, nausea, vomiting, irritability, neurological weakness, numbness, abdominal cramps, sleep disturbances, hypoglycemia etc.

- ***Vitamin B6: -***

It is also called as pyridoxine; it is involved in many aspects of macronutrients metabolism; it is present in many food products naturally.

Main sources of vitamin B6: -

It is present in watermelon, quince, chicken, bread, egg, vegetable, soyabean, whole grain cereals, brown rice, fish, legumes, beef, nuts, beans, liver, citrus fruits, starchy vegetables, potato, cucumber etc.

Basic pharmacokinetic of vitamin B6 (based on human intake in natural food products): -

It is absorbed in small intestines, but before absorption a phosphate group has to be removed making vitamin B 6 in free form & absorbed by passive transport, now reaches liver via portal vein, in liver to get metabolized & flown into the blood stream it is bound with albumin & some are taken up by red blood cells, once getting in blood it can function & promote health & it is excreted mainly in urine & little is excreted in stools, it is very little stored in tissues, muscle tissues, liver, brain, kidneys, spleen.

Basic clinical pharmacology of vitamin B6: -

It is needed for proper development & function of brain in children; it is needed for neurotransmitter, histamine, haemoglobin synthesis & function. It serves as coenzyme (cofactor) for many reactions in the body, it is the master vitamin for processing amino acids & some hormones, it is needed by the body to prepare serotonin, melatonin & dopamine, it is better to intake it during treatment of tuberculosis. It supports adrenal glands to function; it acts as a coenzyme in the breakdown & utilization of fats, carbohydrates, protein, it is important for immune system, it helps in treatment of nerve compression like carpal tunnel syndrome, premenstrual syndrome, depression, arthritis, high homocysteine level, diabetes, asthma, kidney stones etc.

Its deficiency causes seborrheic dermatitis (eruption on skin), atrophic glossitis with ulceration, conjunctivitis, neuropathy, anaemia etc.

- ***Folate (vitamin B9): -***

Folate is an essential micro nutrient, it is a natural form of vitamin B9, it serves many important functions of the body, it plays an important role in cell growth & formation of DNA, RNA & other genetic material & helps in treating many diseases; it name is derived from Latin word Folium, which means leaf, leafy vegetables have it in good amount; Folic acid is a synthetic form of vitamin B9.

Main sources of folate: -

It is present in watermelon, quince, dark green leafy vegetables, fruits, nuts, beans, dates, seafood, egg, dairy products, meat, chicken, legumes, beetroot, citrus fruits, broccoli, spinach, cereals, cucumber etc.

Basic pharmacokinetic of folate (based on human intake in natural food products): -

Its absorption is complicated because folate present in food are of many different forms, some of which cannot be absorbed until broken down by intestinal enzymes; it is not absorbed more than 50%; dietary folate contains glutamate that need to separate it from glutamate before absorption starts; It is absorbed in duodenum & jejunum, after absorption it is converted into tetrahydrofolate (the active form of folate), than a methyl group is added to it to form methyltetrahydrofolate; now the body uses it for various functions & metabolism; the body can store folate 20-70mg in liver which is enough for 3 -6 months for the body; it gets excreted in urine & little in stools & bile.

Basic clinical pharmacology of folate: -

It is needed by the body to make DNA, RNA & other genetic material; it prevents many disease & conditions like anaemia, stroke, cardiac diseases, cancers, neurological diseases, macular degeneration (eye disease), palpitation, sores in mouth & tongue, hair fall, graying of hair. It is important in fertilization in male & female, essential during pregnancy to prevent neural tube defect in embryo (it is needed more), it protect us from free radicals & oxidation thus prevent cancers, it is essential in red blood cells formation, reduces high levels of homocysteine.

Its deficiency may cause anaemia, tiredness, palpitation, breathlessness, hairfall, neural tube defect in baby during pregnancy etc.

- ***Potassium: -***

It is a mineral with symbol K & atomic number 19, it is an essential mineral which body cannot prepare; it is necessary for heart, kidney & other organs to function, its low level in body is called as hypokalemia & high level is called as hyperkalemia; it is mostly present inside the cells (intracellular); normal blood range is 3.5 to 5.0 milli equivalents per/liter (mEq/L).

Main sources of potassium: -

Potassium is naturally present in banana, orange, dates, raisin, broccoli, milk, chicken, sweet potato, pumpkin, spinach, watermelon, coconut water, white & black beans, potato, dried apricot, beetroot, pomegranate, almond, quince, cucumber etc.

Basic pharmacokinetics of potassium (bases on human intake in natural food products): -

It is absorbed in small intestines by passive diffusion; it is stored mostly inside the cell, little in liver, bones & red blood cells. 80 to 90% potassium is excreted in urine & 5 to 20% is excreted in stools, sweat.

Basic clinical pharmacology of potassium: -

It is a mineral belongs to electrolytes of the body; it conducts electrical impulses throughout the body & assists blood pressure, normal water balance, muscle contraction, nerves impulse, digestion, heart rhythm, maintain pH balance. It is not produced in our body so we need to consume it through eating; Kidneys maintain normal level of it in the body by excreting excessive amount of it in urine or reabsorb it if the amount is less in the body so that the body may reuse it. Its deficiency may cause weakness, low blood pressure, constipation, nausea, vomiting etc.

Its normal amount in body keeps blood pressure normal; water balance in body normal; prevents heart disease, stroke, osteoporosis, kidney stone etc.

- ***Sodium: -***

Here we are learning natural sodium, its symbol is Na & atomic no. 11; it is not produced in the body we need to take it in food sources; it is an important & essential mineral on which our body functions; it regulates blood pressure, blood volume etc.

Main sources of sodium: -

Excessive intake of sodium should be avoided; cucumber has very less amount of sodium; vegetables & fruits have less sodium in them which is good for the body. It is present in beans, meat, fish, chicken, chilli, bread, rolls, milk, celery, beetroot etc.

Basic pharmacokinetic of sodium (based on human intake in natural food products): -

It is absorbed in ileum by active sodium transport because it is impermeable & in jejunum absorption takes place via mediated active transport & depends on levels of water, bicarbonate, glucose, amino acids etc; its absorption plays an important role in the absorption of chloride, amino acids, glucose & water; similar mechanism are involved in the reabsorption of it in kidneys when its level in the body falls. It is excreted mainly in urine, little in sweat & stools. It is stores in bones & dissolved in various body fluids.

Basic clinical pharmacology of sodium: -

It is amongst the essential electrolyte within the body, it remains in extracellular fluid (outside the cell) mainly, it carries electrical charges within the body, kidney maintain its normal level in the body, normal level is 135-145 milli-equivalent per liter (mEq/L), it is not produce in the body, it acts on muscles contraction, nerve cells, regulates blood pressure, blood volume; it takes part in every function of the body mostly, its low level in body is called as hyponatremia, it is found more in older aged, kidney disease, heart disease, hospitalized patient, this condition may cause brain edema, low blood pressure, fatigue, tiredness etc; its high level in the body is called as hypernatremia may cause increase in blood pressure, thirst, confusion, muscle twitching or spasm, seizures, weakness, nausea, loss of appetite, swelling in body etc.

- ***Flavonols: -***

Flavonols are polyphenols & belong to class of flavonoids; they are colourless molecules that accumulate mainly in the outer & aerial tissues (skin & leaves) of the fruits & vegetables because their biosynthesis is stimulated by light so absent in inner parts of fruits & vegetables. There are more than 7000 flavonoids discovered yet & many more are to be discovered.

Main sources of flavonols: -

It is present in tea, leek, onion, broccoli, kale, berries, grapes, quince, cucumber etc.

Basic pharmacokinetics of flavonols (based on human intake in natural food products): -

Its absorption, metabolism & excretion in natural form are not yet known & are under research. Flavonoids are mostly absorbed in small intestine, after absorption flavonoids conjugates with glucuronic acid or sulfate or methylation may occur; no free flavonoids are found in plasma or urine except catechin; the part of it which remains undigested is degraded into phenols in colon (large intestines) by microorganisms & absorbed, the absorbed part is further metabolized in liver; it is excreted via urine & bile.

Basic clinical pharmacology of flavonols: -

All types of flavonols are anti oxidant, anti inflammatory, anti cancer, reduce oxidative stress, maintains heart health, helful in asthma, stroke, helps in regulating cellular signaling etc.

- ***Calcium: -***

It is natural essential mineral for the body, it is among the electrolytes of the body; its symbol is Ca & atomic no. 20.

Main sources of calcium: -

It is present in watermelon, quince, milk, banana, cheese, green leafy vegetables, soya beans, nuts, fish, meat, egg, bread, flour, yogurt, almonds, kale, soybean, spinach, cucumber etc.

Basic pharmacokinetics of calcium (based on human intake in natural food products): -

Calcium is absorbed in duodenum & upper jejunum (when calcium intake is low) by transcellular active transport process, this depends on action of calcitriol & intestinal vitamin D receptors & when calcium intake is high, absorbed by paracellular passive process throughout the length of small intestine by 3 major steps, entry across the brush border, intracellular diffusion via calcium-binding protein & extrusion; Vitamin D is necessary for absorption of calcium, also vitamin C, E, k, magnesium & exercise increases the absorption of calcium. Also the level of calcium is regulated by calcitonin released by thyroid gland it reduces calcium level in blood when it is excessive & increases the excretion of calcium via kidneys; Parathyroid hormones (PTH) released by parathyroid gland increases the blood level of calcium when body need it or calcium is less in blood & promotes reabsorption of it in kidneys (calcitonin & PTH both have opposite function). Intestines can absorb 500 to 600 mg of calcium at a time; it is mostly stored in bone tissues & teeth & excreted in stool & sweat & little in urine depended upon the level of it in blood. Also estrogen act on transport of blood calcium in bones thus women mostly suffer from osteoporosis after menopause.

Basic clinical pharmacology of calcium: -

Calcium acts on bone health, communication between brain & other parts of the body, muscles contraction, blood clotting; it is a co-factor for many enzymes, it relaxes the smooth muscles & blood vessels; it maintains heart rhythm, muscles function; it is more needed in childhood & deficiency of it in childhood may cause convulsions (seizure); Excessive level of it in blood is called as hypercalcemia & may lead to kidney stone formation, heart attack, stroke, loss of appetite, excessive urination, memory loss

etc; its low level in blood is called as hypocalcemia & may lead to cramps in the body, weak bones, weak teeth, numbness, tingling etc.

Contraindication: -

Sarcoidosis, excessive level of calcium in blood, very severe constipation, kidney stones, increased activity of parathyroid gland etc. Hypersensitivity of calcium, severe cardiac diseases, hypercalcemia, hypercalciuria, severe kidney stones etc.

- ***Iron: -***

It is an essential mineral for our body; its symbol is Fe & atomic no. 26; it is an important component of heamoglobin (heamoglobin binds oxygen in lungs & supply it to whole body, it is oxygen carrier).

Main sources of iron: -

It is present in watermelon, quince, meat, dates, spinach, egg, nuts, dark leafy green vegetables, broccoli, pumpkin seeds, chicken, legumes, fish, banana, cabbage, kidney, almonds, cucumber etc.

Meat is the best source of iron, it provides Fe+2 directly which can be transported from intestine to blood steam through Fe+2 transporter ferroportin (this binds with transferring & delivered into tissues).

Basic pharmacokinetics of iron (based on human intake in natural food products): -

The absorption of iron is not known fully; about only 10% of iron taken in food is absorbed; it is absorbed in duodenum & upper jejunum mainly & at the end part of ileum; low pH is needed for its absorption, after absorption it get bind to transferring (each transferring can carry 2 atoms of iron); ceruloplasmin (protein) also helps in binding of iron; Hepcidin a hormone produced by liver is released when iron stores are full & inhibits iron transport & binding, thus reduces the absorption of iron; vitamin C & copper enhances iron absorption.

Storage of iron: -

Iron is stored in liver (in hepatocytes & kupffer's cells) kupffer's cells play an important role in recycling body iron, they ingest aged RBC liberate iron for it & reuse by breaking down heamoglobin. Little iron is stored in liver, heart, & kidneys in form of ferritin also little in bone marrow, spleen.

Excretion of iron: -

The body does not possess a physiological mechanism for regularly eliminating iron from the body because most of it is recycled by liver cells; iron is lost within cells, from skin & interior surface of the body (intestines, urine, breathe).

Basic clinical pharmacology of iron: -

It is an important component of Haemoglobin (heamoglobin bind oxygen in lungs & supply it to whole body); iron is beneficial for nails, hair, skin etc; it acts on blood production, its deficiency causes Anaemia (low haemoglobin level in blood) (this causes reduced in oxygen carrying capacity & supply of it); most of the iron is present in haemoglobin, it consist of one heme (iron), one protein chain (globin) this allows it to bind & load oxygen from the lungs & supply it to whole body.

Unbounded or free iron is highly destructive & dangerous it can trigger free radical activity which can cause cell death & destroy DNA.

- ***Copper: -***

It is an essential micronutrient mineral; its symbol is Cu & atomic no. 29; there are lot of health benefits of it; it is needed in little amount in the body.

Main sources of copper: -

It is present in watermelon, quince, spirulina (water-plant), nuts, seeds, lobster, leafy green vegetables, guava, grapes, green olive, kiwi, mango, pineapple, pomegranate, egg etc.

Basic pharmacokinetics of copper (based on human intake in natural food products): -

It is absorbed 30 to 50%; it is absorbed easily than other minerals, its absorption depends on the copper present in the body, when the intake of it is less, absorption is increased & when intake is more absorption is less, it is mainly absorbed in small intestines & little in stomach via carrier-mediated process; its absorption is influenced by amino acids, vitamin C & other dietary factors. After absorption it is bound primarily to albumin, peptide & amino acids & transported to liver. Copper is secreted into plasma as a complex with ceruloplasmin. It is mainly stored in liver little in brain, heart & kidneys; it is excreted mainly in bile & little in urine.

Basic clinical pharmacology of copper: -

Together with iron it enables the body to form RBC; it helps to maintain health of bones, blood vessels, nerves & immune system; it also acts on iron absorption, protein metabolism, growth of body, it acts also on development of brain, heart & other organ; it is needed by the body for making ATP, collagen. Excessive of it may cause Wilson's disease.

Deficiency of copper: -

It is very rare; but may cause cardiovascular disease, genetic defects, inflammation of optic nerve etc.

- ***Selenium: -***

It is an essential trace mineral, it is micro nutrient helpful to our body; its symbol is Se & atomic no. 34.

Main sources of selenium: -

It is present in watermelon, fish, nuts, beef, chicken, mushroom, egg, grains, garlic, grapes etc.

Basic pharmacokinetics of selenium (based on human intake in natural food products): -

It is mainly absorbed in duodenum & proximal jejunum by active transport process; Dietary selenium is in 2 forms organic (selenoimethionine) it is 90% absorbed & inorganic (selenite) it is 50% absorbed; after absorption it is send in liver via portal veins, liver turns it into selenite & then is bound with selenoproteins & send into blood stream, gets in RBC, muscles, tissues etc; it is not distributed evenly in the body, liver has more of it; Vitamin E & other vitamins increases its absorption & both work as an anti-oxidant. Natural selenium remains in the body for less than 24 hours; it is stored in amino acid in skeletal muscles, little in liver, kidneys & pancreas; it is primarily excreted in urine, stool & expired in air via lungs very little in sweat & semen.

Basic clinical pharmacology of selenium: -

It is important for many body functions, immune system, fertility (both male & female); it contributes in thyroid hormone metabolism, DNA synthesis; it protects the body from oxidative damages & infection, it is found in tissues, skeletal muscles; it helps testies & seminal vesicles in their function; it reduces the risk of miscarriages, liver disease, cancer, asthma, cardio vascular disease; deficiency of it causes pain in muscles & joints, weaken the hair, nails, white spots on nails are found etc.

- ***Magnesium: -***

It is an important essential mineral; its symbol is Mg & atomic no. 12; it is a co-factor for more than 300 enzymes that regulates functions in the body. Its normal range in blood is 0.75 to 0.95 millimoles (mmol)/L.

Main sources of magnesium: -

It is present in watermelon, quince, spinach, meat, egg, nuts, dark leafy green vegetables, broccoli, pumpkin seeds, dates, chicken, fish, legumes, cucumber etc.

Basic pharmacokinetics of magnesium (based on human intake in natural food products): -

It is absorbed about 20 to 50% only; it is absorbed about 40% in distal intestine when the level of it is low via passive paracellular transport & about 5% in descending colon when the level of it is high via active transcellular transport. Vitamin D increases its absorption & also acts on its excretion in urine. It is excreted in urine & stool; it is stored in bones.

Basic clinical pharmacology of magnesium: -

It is a co-factor for more than 300 enzymes that regulates functions in the body. It act on protein synthesis, muscles & nerve function, blood glucose, control blood pressure, it is required for energy production, bone development, synthesis of DNA & RNA. It also plays a role in active transport of calcium & potassium ions, muscles contraction, normal heart rhythm etc.

- ***Phosphorus: -***

It is an essential mineral; its symbol is P & atomic no. 15, it is needed for many parts & functions of the body.

Main sources of phosphorus: -

It is present in watermelon, quince, meat, nuts, beans, fish, chicken, dairy products, soy, grains, lentils, cucumber etc.

Basic pharmacokinetics of phosphorus (based on human intake in natural food products): -

It is absorbed 70-85%, it is absorbed 30% in duodenum, 20% in jejunum, 35% in ileum; it is absorbed in inorganic phosphate form by 2 separate process first when the phosphorus intake is high mainly after meals by paracellular sodium independent passive diffusion pathway & second is transcellular sodium dependant carrier-mediated pathway this falls under the control of vitamin D & etc. When calcium level is too high in the body phosphorus is less absorbed, optimum calcium : phosphorus ratio is helpful in its absorption (excess of anyone decreases the absorption of both). It is stored in bones 85% & rest in tissues; it is excreted 80% in urine & rest in stools (excretion of it is a regulatory action of parathyroid hormone (PTH), vitamin D, and fibroblast).

Basic clinical pharmacology of phosphorus: -

It is present in nature combined with oxygen as phosphate. It acts on growth of teeth, bones, repairs of cells & tissues. It plays an important role in metabolism of carbohydrate, fats, protein & ATP. It works with B-complex vitamins & helps kidney function, muscles contraction, normal heart beats, nerve impulse etc.

- ***Zinc: -***

It is a trace mineral; symbol is Zn & atomic no. 30; it is necessary for human body as it plays vital role in health.

Main sources of zinc: -

It is present in watermelon, quince, meat, fish, legumes, beans, egg, dairy products, seeds, nuts, whole grains, cucumber etc.

Basic pharmacokinetics of zinc (based on human intake in natural food products): -

It is absorbed 20 to 40%, its absorption depends on its concentration & is absorbed in whole intestines (jejunum has high rate of its absorption) via carrier-mediated mechanism, it is released from food as free ions during digestion. Zinc from animal sources is easily absorbed comparing to plants sources. It is present in bile & pancreatic juices which is released in duodenum & is reused by the body this is called as endogenous zinc & zinc present is food sources is called as exogenous zinc. Its absorption depends on 2 proteins- Albumin & metallophinonein. Albumin enables zinc to be transported from plasma into enterocytes. It is stored in muscles, bones mainly & little in prostate, liver, kidneys, skin, brain, lungs, heart & pancreas. It is excreted in stools 80% & rest in urine & sweat. Metallophinonein binds to zinc to

make it unavailable & excrete it in stools when zinc is excess in the body, & production of metallophinonein is reduced when zinc is less in the body to make zinc available for the body.

Basic clinical pharmacology of zinc: -

It is necessary for immune system, prevents skin diseases, heal skin diseases, helps stimulate activity of at least 100 different enzymes in the body; it is required in little amount in the body, but children, pregnant & old aged need it more. It promotes growth in children, synthesize DNA & acts on wound healing, it is best in treating initial diarrhea & cold cough. It improves learning, memory, fertility etc. It heals acne, attention deficit hyper activity disorder (ADHD), osteoporosis, pneumonia etc.

- ***Manganese: -***

It is an essential mineral & micro nutrient, needed by the body for proper health. Its symbol is Mn & atomic no. 25.

Main sources of manganese: -

It is present in watermelon, nuts, beans, legumes, brown rice, leafy green vegetables, pineapple, beetroot etc.

Basic pharmacokinetics of manganese (based on human intake in natural food products): -

It is absorbed 40%, it is absorbed more in women than men; if intake of it is more, than absorption is less & if intake is less, absorption is more; its absorption takes place in small intestines, after absorption it is bounded to blood protein transferring & transmanganin & transport via blood stream to tissues; it is absorbed by inhalation & dermal (skin) also; it crosses brain blood barrier. It is stored in bones, liver, kidney, pancreas; it is excreted mainly in bile & stools, little in urine & sweating; unused manganese is transported to liver for excretion & excreted via bile mainly.

Basic clinical pharmacology of manganese: -

It is needed for proper health of skin, bones, cartilage etc; it helps in glucose tolerance, regulates blood sugar, reduces inflammation, reduces premenstrual cramps, it also aids in formation of connective tissues, bones, sex hormones, blood clotting, metabolism of carbohydrates & fats; it facilitates calcium absorption.

- ***Boron: -***

It is natural minerals present in beetroot; it has lot of health benefits. Its symbol is B & atomic no. is 5; it is a trace mineral important for bone health.

Main sources of boron: -

It is present in beetroot, apple seed, raisin, almond, peanut, dried apricot, raisins etc.

Basic pharmacokinetics of boron (based on human intake in natural food products): -

It is absorbed in intestine mainly & completely, it is little absorbed through skin & inhalation, it is believed that it is absorbed via passive transport in the form of borate (research is on); it is excreted mainly in urine, 2% in stool, little in sweat & breath.

Basic clinical pharmacology of boron: -

It is best for nerve function & nerve booster, good for brain, it is health enhancer, improves calcium metabolism, helps to handle other minerals, cardio vascular health, reduces allergy, reduces auto immune reaction, make bones, teeth & gums strong, cure arthritis, lupus erythematosis, increases sex hormones, estrogen, testosterone; it is antioxidant, aphrodisiac & detox etc.

Deficiency of it may cause alter in brain activity thus hamper neuronal function, alter brain wave activity enhancing delta power in the left parietal & temporal lobes & decreased frontal lobe activity.

- ***Dietary fibre: -***

It is an eatable part of vegetables & fruit; our body cannot digest it just passes the small intestines & colon & excrete in stools; it is of two types 1) soluble fibre 2) insoluble fibre.
Soluble fibre dissolve in water & form a gel like material & helps in controlling blood cholesterol & blood glucose; it is found in apple, carrot, barley, oats, peas, beans watermelon etc.
Insoluble fibre do not dissolve & promotes excretion & increase bulk of the stool thus relief constipation & helps in elimination of toxins also. It is found in wheat flour, beans, cauliflower, potato, green beans, watermelon, beetroot, beet leaves etc.
This is the reason it is helpful in constipation conditions, it can eaten in pregnancy to relief constipation and get other benefits of it also.

Basic pharmacokinetics of dietary fibre (based on human intake in natural food products): -

Soluble fibres get dissolve in water & become a gelatinous substance; do not get digested; it helps to slow the digestion & help the body to absorb vital nutrient from eaten food.
Insoluble fibres do not dissolve in water but remain in fibrous form, and do not get digested; it helps the food pass through the digestive sytem and increase the bulk of stool & eliminate toxins also.

Basic clinical pharmacology of dietary fibre: -

It helps in slow down the digestive process thus gives a good control in blood glucose, improves insulin sensitivity, reduces risk of diabetes, maintains weight, helpful in obesity, reduces blood pressure, reduces cholesterol, reduces inflammation, reduces risk of heart disease, relieves constipation thus helpful in piles, fistula & other rectal disorders & disease, improves bowel movement thus improves bowel health, slowdowns the digestion thus improves quality of digestion, reduces risk of many types of cancer.

- ***Absorption & digestion of amino acid.***

When we eat high-protein foods, body breaks down protein into amino acids and peptides through digestive enzymes, such as pepsin & pancreas produces trypsin, chymotrypsin and other that aid in protein digestion.
Pepsin is the primary enzyme responsible for digesting protein; it acts on the protein molecules & breaks the bonds – called peptide bonds – that hold the protein molecules together. Next, these smaller chains of amino acids move in the stomach & then in small intestine where they're further broken down by enzymes released by the pancreas. Small intestine contains finger-like extensions called micro-villi. These structures enhance its ability to absorb dietary nutrients. Now the semi digested material pass through brush border and baso-lateral membranes of small intestine & di-tripeptides are absorbed by passive transport (facilitated or simple diffusion) or active transport (Na+ or H+ co-transporters) pathways. Di and tripeptides are more efficiently absorbed than free amino acids which in turns are better absorbed than oligopeptides. They're released into the bloodstream and used for various biochemical reactions.
Each amino acid has a different role in the human body. Upon absorption, some amino acids are incorporated into a new protein. Some fuel your muscles and support tissue repair. Others are used as a source of energy.
Tryptophan and tyrosine, for example, promote brain health. These amino acids support the production of neurotransmitters, leading to increased alertness and optimum nerve responses. Tryptophan also assists with serotonin production, lifting your mood and keeping depression at bay.
Phenylalanine serves as a precursor to melatonin, epinephrine, dopamine and other chemicals that regulate your mood and bodily functions. Methionine helps your body absorb selenium and zinc, two

minerals that promote overall health. Some amino acids, such as isoleucine, play a vital role in hemoglobin production and glucose metabolism.

- ***Tryptophan: -***

It is an amino acids (protein) that is useful in bio-synthesis of protein; it is essential in human because body cannot make it); it is a precursor of neuro-transmitter serotonin, melatonin, vitamin B3; it is a sedative also.

Main sources of tryptophan: -

Salmon oil, egg, spinach, milk, seeds, fenugreek seed, soy products, nuts, fish, meat, wheat, banana etc.

Basic pharmacokinetics of tryptophan (based on human intake in natural food products): -

It is absorbed in small intestine & reached the blood circulation, it passes the blood brain barrier & in brain cells it is metabolized into indolamine neuro-transmitter, niacin, a common example of indolamine is serotonin derivative from tryptophan. Tryptophan is converted into serotonin in the brain & body; it is believed that tryptophan supplements should be taken with carbidopa, which blocks the blood brain barrier. (Serotonin (5HTP) 5 hydroxytryptamine, is a monoamine neuro-transmitter. It contributes in feelings of well-being, happiness, reward, learning, memory, many physiological functions).

In the pathway of tryptophan/serotonin, melatonin hormone is produced. Melatonin regulates sleep-wake cycle. It is primarily released by pineal gland in brain. It controls circadian (daily clock) rhythms.

Pineal gland releases it at night more & very little in day light. It improves immune system function.

Natural sources of melatonin are tomato, pomegranate, olive, grapes, broccoli, cucumber, barley, seeds, nuts etc.

Fructose malabsorption causes improper absorption of tryptophan in intestine thus leading to low level of it & may cause depression.

Basic clinical pharmacology of tryptophan: -

It is necessary for normal growth of infants; nitrogen balance in adults, it aids in sleep pattern, mood. It is necessary for melatonin & serotonin formation in body, it enhances mental & emotional well being, manages pain tolerance, weight etc. it also helps in build muscle tissue, essential for vitamin B3 production, relives insomnia, reduces anxiety, depression, migraine, OCD, helps immune system, reduces cardiac spasms, improves sleep patter etc.

- ***Threonine: -***

It is an amino acid used in biosynthesis of proteins; it is an essential amino acid important for tooth enamel, collagen, elastin, nervous system, fats metabolism, it prevents fats buildup in liver, useful in intestinal disorders, anxiety, and depression.

Main sources of threonine: -

Cheese, chicken, fish, meat, lentil, black seed, nuts, soy etc.

Basic clinical pharmacology of threonine: -

It is useful in nervous system disorders, multiple sclerosis, spinal spasticity, makes bones, joints, tendons, ligament stronger, it helps the immune system, promotes heart health.

- ***Isoleucine: -***

It is an amino acid that is used in the biosynthesis of proteins, it is an essential amino acid means the body cannot make it & we depend on food sources, it plays & helps many functions of the body.

Main sources of isoleucine: -

Meat, mutton, fish, cheese, egg, seeds, nuts, soybeans, milk, legumes, fenugreek seed etc.

Basic pharmacokinetics of isoleucine (based on human intake in natural food products): -

It is absorbed in small intestine by sodium-dependant active transport. It is metabolized in liver.

Basic clinical pharmacology of isoleucine: -

It promotes glucose consumption 7 uptake, it is anti-catabolic, enhances athletic performance & best for pre-workout, it acts on wound healing, detox of nitrogenous waste in the body, stimulates immune system, promotes secretion of many hormones, helps in heamoglobin formation, regulating blood glucose, energy in the body, built muscles, helpful to brain for its function.

- ***Leucine: -***

It is branched chain amino acid (BCAA) it is ketogenic amino acid; it is necessary when we do exercise, it stimulates protein synthesis & assists in muscle building.

Main sources of leucine: -

Cheese, soyabean, meat, nuts, chicken, seeds, fish, seafood, beans.

Basic clinical pharmacology of leucine: -

It helps regulate blood glucose, promotes growth, recovers the muscles & bone tissues, acts on production of growth hormones, repairs the tissues, essential for muscle building, it burns fats, controls obesity, promotes lean muscles growth.

- ***Lysine: -***

It is an essential amino acid, which our body cannot prepare and we need to eat it from food sources. It necessary for many body functions, acts in building blocks of protein (muscles).

Main sources of lysine: -

Red meat, chicken, egg, fish, beans, lentils, wheat germ, nuts, soybeans, spirulina, fenugreek seed, shrimp, pumpkin seed, tuna, cheese, milk etc.

Basic pharmacokinetics of lysine (based on human intake in natural food products): -

It is absorbed from the lumen of the small intestine into the enterocytes by active transport, it undergo first pass metabolism in liver & is metabolized in liver.

Basic clinical pharmacology of lysine: -

It helps the body in tissue growth, repair muscles injury, promote collagen formation, help the body to produce enzymes, antibodies, hormones, supports immune sytem, its deficiency causes fatigue, irritability, nausea, hair loss, anorexia, inhibited growth, anemia, problems with reproductive system, it is very helpful in treating cold sores (herpes), control blood pressure, diabetes, osteoporosis, helps athletes performance, helpful in treating cancers, reduces anxiety, increase absorption of calcium, improves digestion & prevent leaky gut, helpful in pancreatitis.

- ***Valine: -***

It is an essential nutrient for vertebrates, biosynthesis of protein; it is an aliphatic & extremely hydrophobic essential amino acid; it is branched chain of amino acid (BCAA); it is important for growth, repair, blood glucose regulation, for energy; it stimulates CNS, proper mental function.

Main sources of valine: -

Cheese, soy, beans, nuts, fish, meat, chicken, mushroom, seeds, nuts, whole grains etc.

Nutrition Facts

Thyme

Amount Per 100 grams

Calories 101

		% Da
Carbohydrates	24.45 g	18%
Protein	5.56 g	10%
Total Fat	1.68 g	8.4%
Cholesterol	0 mg	0%
Dietary Fiber	14.0 g	37%
Folates	45 µg	11%
Niacin	1.824 mg	11%
Pantothenic acid	0.409 mg	8%
Pyridoxine	0.348 mg	27%
Riboflavin	0.471 mg	36%
Thiamin	0.48 mg	4%
Vitamin-A	4751 IU	158%
Vitamin-C	160.1 mg	266%
Sodium	**9 mg**	**0.5%**
Potassium	**609 mg**	**13%**
Calcium	405 mg	40.5%
Iron	17.45 mg	218%
Magnesium	160 mg	40%
Manganese	1.719 mg	75%
Manganese	106 mg	15%
Zinc	1.81 mg	16.5%
Carotene-ß	2851 µg	--

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- ***Research: -***

SCIENCE & HADEES REGARDING THYME: -

In Hadees it is mentioned to fumigate the houses with it: -

Its oil is rich in thymol, carcacrol & etc, which are best in fumigation against bean, insects & bacterias. Its plant was burned as a fumigator in sick rooms and hospital wards. It was used as incense for many types of religious ceremonies as well.

Pharmacological aspects: -

Thyme contains a number of anti-inflammatory compounds, including luteolin and rosmarinic acid, which may provide health benefits for people with certain anti-inflammatory conditions such as rheumatoid arthritis, asthma and inflammatory acne. Luteolin has been shown to exert strong inhibitory effects against TBK1, an enzyme that has been linked to inflammatory diseases. The rosmarinic acid in thyme, in turn, is thought to exert anti-inflammatory activity by inhibiting lipoxygenase and cyclooxygenase, two enzymes that have been associated with inflammatory responses. Thyme contains several phytochemicals (such as ursolic acid, rosmarinic acid and luteolin) that have been linked to anti-cancer activity in laboratory studies. It has a strong inhibitory activity against Helicobacter pylori.

CONCLUSION OF RESEARCH: -

Fumigate the houses with thyme; it has major healing, preventive, curative constituents. It is easy available, cheap. The amazing Thyme benefits can be attributed to its rich nutritional value. The nutrients in Thyme have disease-preventing and health-promoting properties. This aromatic herb is loaded with phytonutrients, minerals and vitamins which are vital for good health. Thyme (Thymus Vulgaris L.) is an important medicinal plant which belongs to the Lamiaceae family; it has been used for centuries as spice, home remedy, drug, perfume and insecticide. Thyme has anti-hyperglycemic and anti-lipidemic effect, and kidney functions improvement, which may be helpful in the treatment of diabetes and other diabetic related complications. Thymus Vulgaris essential oil is one of the most commonly used essential oils in the food industry and in cosmetics as preservatives and antioxidants.